# RE-READING “WHAT IS INTERACTION? ARE THERE DIFFERENT TYPES?”

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# WHAT IS INTERACTION? ARE THERE DIFFERENT TYPES?

## Hugh Dubberly, Paul Pangaro, Usman Haque

### 2.Questions and Challenges

1. The conclusion of this text is that designers and architects alike should look for cybernetics and conversation theory in order to design more successful and engaging products and experiences. This is a particularly deterministic view and moves under the assumption that technology must be deployed in a successful design. Given this one sided perspective what other thoughts may arise when the role of technology in design and architecture is questioned?

2. The text claims that no machines currently exist that can be considered learning machines. The text even specifically calls out Google saying that their search algorithm (including behavioral statistics) does not learn. However, this text is 7 years old and we now know that Google's algorithm can in fact learn. What are other examples of machines (hardware or software) that now exist?

3. Given that this text is deeply rooted in cybernetics it relies heavily on the classification of systems. How can understanding and categorizing complex systems help architecture or make a difference in the architectural design process?

### 3. Documentation of Responses

During the discussion following the reading presentation a point was made in response to question 1. The comment was that technology is all around us it can be a distraction and can lead to inabilities to focus when we are constantly overloaded with media and data. This can be a particularly dangerous road to take for architecture. If architecture takes on this bombardment of media as a strategy for design the ability for architectural space to exist, be understood or experienced could be lost. The discussion of this rift that technological determinist architecture can create in our lives was echoed by a couple of students. As a personal response to this comment I can recognize this concern yet disagree with it. The comments seemed to echo Sherry Turkles concerns for media and computers in early educational facilities and a lack for "digital natives" to understand and appreciate the real. While I don't disagree that a paradigm shift might occur under such conditions I would disagree that this is a bad thing. Change is always scary but I imagine similar outcries existed with the advent of antibiotics, electricity and aviation. Change is natural and beautiful and you don't have to be a technological determinist to appreciate it.

In response to the second question a few comments regarding not only the development of learning machines but the change in technological development since this article was authored. One comment was a that many products and services developed

since this article was written. Google is not the only example and in fact the ways in which now Google can be used to understand particular demographics from their behavioral statistics other technologies have morphed. The example given was that of Facebook and Twitter. These technologies were intended for communicating with friends however, given their role in the recent Arab Spring uprisings and protests the change in the intended use for these technologies is clear.

In response to the third question a brief discussion occurred regarding the dangers of attempting to design using complex systems. The concern was that an over simplification can occur. When attempting to work with systems beyond the scope of our human understanding an over simplification can occur and as a result in correct assumptions can be made that would be detrimental to the users of a design had the design not attempted to be complex. The example given was the weather and our inability to understand it. While the point was well noted I would disagree with two aspects of this argument. First, the weather is something that can be understood, this doesn't me we can control it but we sufficiently are aware of how weather patterns occur and can with relative accuracy predict such occasions. Secondly, the use of complex systems as a designer is not the limitations of human understanding but rather the limitations of that designer. For example, an architect who attempts to calculate complex structure without the use of an expert may fine themselves with a toppling structure. However, if that designer who did use a consultant when they realized additional expertise was needed would be in a better position. Given that we (as humans) have now sequenced the human genome and have designed and built particle colliders I believe it is safe to say that a designer would be able to find an expert in any system they needed to work with. Additionally, a designer (not a scientist etc) would most likely not work with systems so complex as to push human understanding. Meaning it will not likely be an architect who discovers the cure for cancer. That being said it was a valid point although I found it explanation as far fetched as my rebuttal.

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## 1. Text Summery and Analysis

This fairly straight-forward survey of the principles of interaction makes use of plain language and easy to understand diagrams to introduce various theories of interaction, in particular human-computer interaction.

DESIGN_THEORY

In defining interaction, Dubberly, Pangaro and Haque introduce readers to several design researchers who have put forward different definitions of interaction. Meredith Davis argues that interaction is not limited to human computer interactions, citing books as an example she notes that many artifacts are designed with the user's interaction in mind. Richard Buchanan echoes this point noting, "Interaction is a way of framing the relationship between people and objects designed for them-and thus a way of framing the activity of design…Interaction is a key aspect of function, and function is a key aspect of design." From this perspective the authors note that these definitions are only referring to interaction with static objects, and that interaction with dynamic systems might better categorize human computer interaction.

HCI VIEW

The human-computer interaction model is then defined further by explaining its "archetypal structure-the feedback loop". The authors use the example of a person driving a car explaining that when driving a car a user inputs into the system, the car reacts, the user measures the effect of the action on the environment, thus interpreting the output from the system. Dubberly, Pangaro and Haque state that "the comparison (yielding difference or congruence) directs [the user's] next action, beginning the cycle again. This is a simple self-correcting system—more technically, a first order cybernetic system. "

From this point the authors continue to delve into the issues surrounding theories of interaction. The ways in which humans interact with information loops has been described and categorized in a number of ways. Don Norman proposed two if these models. The Gulf Model and the Seven Stages of Action. The Gulf Model is dubbed such due to Norman's perceived Gulf between the user and the physical system. The Seven Stages of Action elaborates upon the Gulf Model and acknowledges that interaction events can occur top down or bottom up. In this case Norman pontificates that users can have goals that initiate an interaction or perhaps an action in the world then causes the user to be a part of an interaction them did not intend. The author's also introduce Bill Verplank's "How do you… feel-know-do?" model. This model is also a simple feedback loop but this model places "the goal in the context of information theory-thus anchoring our intuition to the value of Alan Cooper's persona-goal-scenario design method."

SYSTEMS_THEORY VIEW

In a self-referential moment Haque recalls an

earlier paper of his scolding designers who use the word interactive to discuss reactive systems. He uses a webpage as an example. When clicking a link on a webpage many designers would argue that this is an interaction however, Haque notes that the client-server system reacts automatically to input and does not evaluate or regulate this click. Therefore this is not an interaction but rather a reaction. In a more complicated example Haque describes how James Watt's fly-ball governor is actually and first order cybernetic system. In a simplified explanation of this case, Haque says that [the fly ball governor] "receives its "goal" from the outside; a person sets the speed of the wheel by adjusting the length of the linkage connecting the fly-ball governor to the steam valve." There for the transfer function is not static but dynamic. The system is not reacting but interacting, and is a closed information loop, a self regulating system and a first order cybernetic system.

In terms of human-computer interactions there are a few key points of differentiation: 1) Humans are inside the loop in HCI models where they were outside the loop in the fly-ball governor example and 2) The nature of the system.

## TYPES OF SYSTEMS

The two key types of systems discussed in this text are static and dynamic systems or systems that cannot act and those which can act and impact their environments. These two types of systems begin a tree of systems relationships From this tree diagram we can see that the systems definitions become more complex within self-regulating systems. As discussed previously simple self regulating systems cannot adjust their own goal (a goal being a relationship between system and environment which the systems seeks to maintain). However, learning systems begin to nest; a first regulating system nested into a second self regulating system is considered a learning system. In a learning system the second system sets the goal for the first and the modification of goals based on the effect of actions is called learning. These are ultimately second-order systems. This nesting is not limited and there can be multiple nests within a learning system. The authors note that Douglas Englebart and John Rheinfrank suggest that "learning requires three levels of feedback: 1) basic processes, which are regulated by first-order loops 2) processes for improving the regulation of basic processes 3) processes for identifying and sharing processes for improving the regulation of basic processes." Additionally, they notes that Douglas Edric Stanley has referred to a moral compass for interactivity, Cornock and Edmonds proposed five distinctions of systems while Kenneth Boulding proposed nine. So it is fair to say that the organization of learning systems is widely disagreed upon and discussed within literature.

## SYSTEM COMBINATIONS

The text mentions that one way to characterize types of interactions is by looking at ways in which systems can be combined. The paper then outlines its

own list of dynamic systems combining linear systems as 0, self regulating systems as 1 and learning systems as 2. This listing system provides six potential pairs : 0-0, 0-1, 0-2, 1-1, 1-2, 2-2. Without explaining each system combination at length the system combinations can be explained in the following:

0-0 systems react to other systems

0-1 systems regulate a simple process

0-2 systems learn how actions affect the environment

1-1 systems balancing competing systems

1-2 systems manage automatic systems and entertain (in this case entertaining is defined as maintaining the engagement of a learning system)

2-2 systems that converse

In addition to the descriptions of these systems it is noted that Kenneth Boulding's systems covers an larger number of combinations discusses learning systems that organized into teams and networks of learning systems which are types of systems not covered in this more simplified view.

In conclusion, the text asks designers to look at a more holistic perspective of interaction when designing. A larger understanding of the fact that most of our daily activities with artifacts and environments are 0-0 systems (and therefore mostly react) would allow our world to become richer as designers utilize 2-2 systems as the new primary model of interaction.